The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte REINER ESCHBACH

Appeal No. 2006-1249
Application 09/737,512

ON BRIEF

Before THOMAS, JERRY SMITH, and SAADAT, Administrative Patent Judges.

THOMAS, Administrative Patent Judge.

DECISION ON APPEAL

Appellant has appealed to the Board from the examiner's final rejection of claims 7 and 10 through 12.

Independent claim 7 is reproduced below.

7. In a xerographic or other non-impact printing/ copying environment, a method for enhancing a digital image exhibiting uneven exposure, said method comprising:

receiving input data that define an input image that exhibits uneven exposure;

deriving from said input data lightsource data that represent an image of a lightsource in said input image, said step of deriving lightsource data comprising:

(i) subsampling said input data to obtain subsampled data defining a subsampled image;

(ii) low-pass filtering said subsampled data, wherein said step of low-pass filtering comprises: (ii)(a) performing a Fourier transform operation on said subsampled data to define said subsampled data in a frequency domain; (ii)(b) low-pass filtering said subsampled data in the frequency domain; and, (ii)(c) performing an inverse of said Fourier transform operation on said low-pass filtered subsampled data to define said low-pass subsampled data in a spatial domain;

(iii) upsampling said low-pass filtered data to derive said lightsource data that define a full-scale image of said lightsource;

deriving enhanced data that represent an enhanced version of said input image, said enhanced data obtained by removing the effect of said lightsource data from the input data.

The following references are relied on by the examiner:

Lieberman et al. (Lieberman)	5,185,671	Feb. 9, 1993
Aach et al. (Aach)	5,708,693	Jan. 13, 1998

Claims 7 and 10 through 12 stand rejected under 35 U.S.C. § 103. As evidence of obviousness, the examiner relies upon Lieberman in view of Aach.

Rather than repeat the positions of the appellant and the examiner, reference is made to the Brief (no Reply Brief has been filed) for appellant's positions, and to the Answer for the examiner's positions.

OPINION

We affirm for the reasons set forth by the examiner in the Answer, as embellished upon here.

As essentially stated by appellant at pages 4 and 5 of the Brief with respect to his view as to what his own admitted prior art in the "Background of the Invention" teaches as well as what Lieberman teaches, the examiner appears to recognize the same as well in the discussion of this reference at pages 3 and 4 of the Answer. Basically, these characteristics of Lieberman and the prior art approaches to homomorphic filters involve processing an entire image, utilizing high-pass filters, then performing a transformation in the frequency domain, performing a high-pass filter operation, and then performing an inverse transformation of the data in the frequency domain back into the spatial domain.

As to Lieberman itself, this is best discussed at columns 4 and 5 and shown in figures 2 and 3 of this reference. At pages 4 and 5 of the Answer, the examiner sets forth various elements of independent claim 7 on appeal that are not specifically taught in Lieberman. At first blush, this apparently rather long list of deficiencies in Lieberman would

lead one initially to suspect the impropriety of the rejection within 35 U.S.C. § 103. On the other hand, as the examiner's analysis becomes more developed beginning at page 5 of the Answer, there appears to be very little dispute as to what Aach teaches from the examiner's perspective or the appellant's perspective at page 5 of the Brief.

What appears to be at first blush a significant weakness in the examiner's view as to the combinability of Aach and Lieberman is well explained when one appreciates that the examiner repeatedly urges the concept of utilizing the teaching value of Aach to essentially replace the whole image approach taught in Lieberman as explained by the examiner at pages 6, 9, 10 and 12 of the Answer. When this approach is fully appreciated, the artisan would well recognize the obviousness of the substitutionary approach the examiner is rationalizing.

The examiner's rationale at pages 10 and 11 of the Answer in response to appellant's argument as to claim 7 in the Brief emphasizes that Lieberman teaches the removal of a specific type of noise, namely lightsource data, from digital image data as compared to Aach's general teaching of removal of noise in any form. There is no dispute between the teachings of the two

references that [this] the undesired noise data is in the low spatial frequency region. The noise elimination feature of Aach as emphasized by the examiner is the aim of Aach of providing an image processing method for noise reduction which also advantageously preserves small details of an image as set forth at column 1, lines 65-67, of Aach.

Appellant's remarks as to Aach at page 5 of the Brief recognize the thrust of Aach's teachings as relied upon by the examiner. These include the approach of subsampling image data in figure 2 as a representation of Aach's decomposition unit in figure 1 by taking the approach of subsampling the image, utilizing low-pass filtering approaches to this subsampled data and performing the frequency transform, another low-pass filtering operation, and then an inverse frequency transformation to bring the data back into a spatial domain.

Even though Aach teaches the use of low-pass filtering functions for subsampled image data rather than for an entire image, it does not appear to use frequency transforms in its methodology. The examiner's continued reliance upon the frequency transform approach in Lieberman is noted at page 6 of the Answer. The key to the combinability and the retained use of

such frequency transforms in the combination is set forth in the discussion in the paragraph bridging columns 4 and 5 of Lieberman. The approach in Lieberman is to enhance the overall image quality by utilizing frequency domain transforms and the inverse of the frequency domain transform as a function of suppressing or otherwise removing the undesired light source data within a given image.

Moreover, the same aim is achieved in a more simplified approach according to the figure 5 embodiment of Lieberman which is discussed beginning at the middle of column 6 of this reference. The discussion beginning at line 40 as to this figure appears to take a more simplified and less costly approach by utilizing a line subtraction technique which appears to us to be a variation of a subsampling approach as more specifically taught in Aach. It appears to us that the artisan would appreciate the discussion at column 7, lines 3-18, of Lieberman as suggesting that the need for human assistance to realize a real time functional operation of image enhancement could still be achieved without human assistance by utilizing the so-called smart autonomous approach of imaging, thus suggesting an increase in speed or a real time operation as an advantage. From this

perspective then, the alternative subsampling approach with low-pass filtering for subsampled image area would have achieved the same result in a less structurally complex circuit and be more attentive to real time operations than in the initial whole image approaches in the earlier figures of Lieberman.

The subtraction approach in claim 10 and the division approach in claim 11 are addressed by the examiner initially at pages 6 and 7 of the Answer with additional buttressing reasoning at pages 11 and 12 of the Answer. Once the subsampling approach is appreciated, the need for upsampling at the end of claim 7 on appeal as to a full image is appreciated since the subsampled data must therefore be "removed" to effect the image enhancement of the whole image. The removal operation at the end of claim 7 is specifically performed by the subtraction or division operations of claims 10 and 11. The subtraction and division features of claims 10 and 11 are best addressed by the examiner at page 7 of the Answer. The division operation at element 114 in the figure 5 embodiment of Lieberman yields a normalized output where division is well known to be a mathematical convention of successive subtraction operations as in claim 10.

In view of the foregoing, the decision of the examiner rejecting all claims on appeal under 35 U.S.C. § 103 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

JAMES D. THOMAS
Administrative Patent Judge)

JERRY SMITH
Administrative Patent Judge) BOARD OF PATENT APPEALS AND INTERFERENCES

MAHSHID D. SAADAT
Administrative Patent Judge)

JDT:psb

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